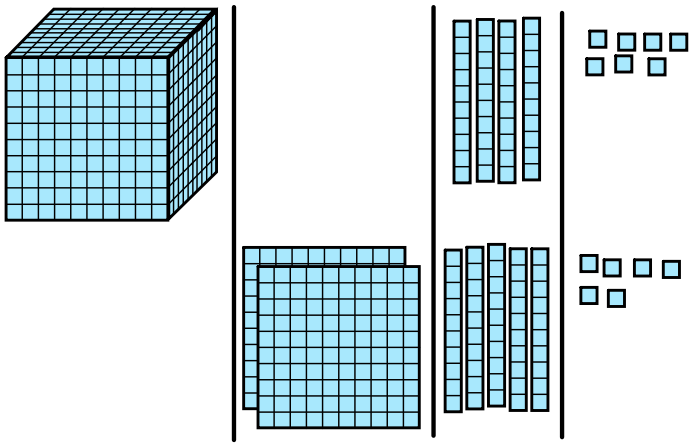
3.2: Algorithms for Addition and Subtraction

Example: (The Standard Algorithm) Add 1047 and 256.
Note: Nowadays, we use the word "trade" or "regroup" instead of "carry".



Standard Algorithm:

$$\begin{array}{r} 1047 \\ +\ 256 \\ \hline \end{array}$$

Example: (The Left to Right Algorithm)

$$\begin{array}{r} 1047 \\ +\ 256 \\ \hline \end{array} \qquad\qquad \begin{array}{r} 2359 \\ +\ 5667 \\ \hline \end{array}$$

Why does this work?

Example: (The Lattice Algorithm)

$$\begin{array}{cccc} & 1 & 0 & 4 & 7 \\ + & & 2 & 5 & 6 \\ \hline \end{array}$$

$$\begin{array}{cccc} & 1 & 7 & 9 & 4 \\ + & 3 & 2 & 9 & 7 \\ \hline \end{array}$$

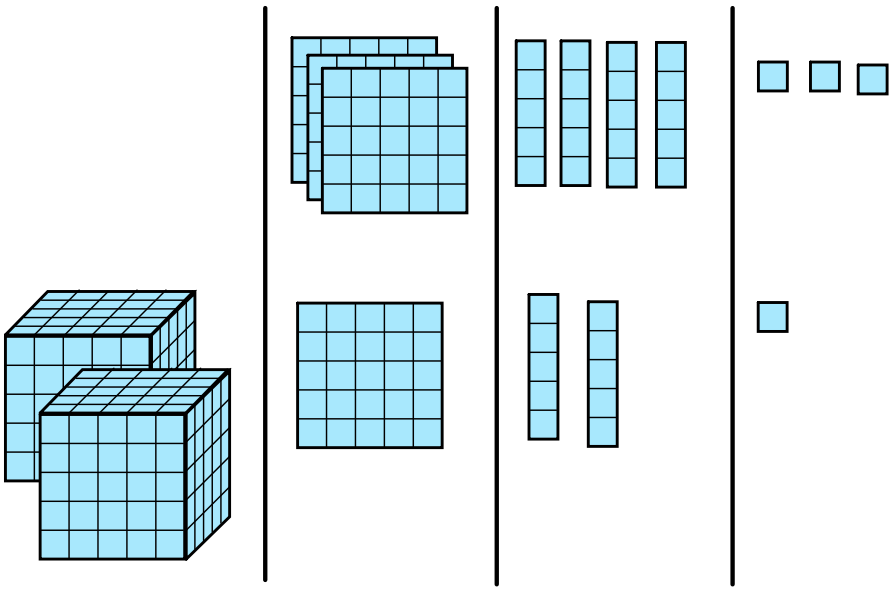
$$\begin{array}{cccc} & 2 & 3 & 5 & 9 \\ + & 5 & 6 & 6 & 7 \\ \hline \end{array}$$

Why does this work?

Base 5 Addition: We can use all of the previous algorithms with base 5 numbers using this table.

3.2 Notes

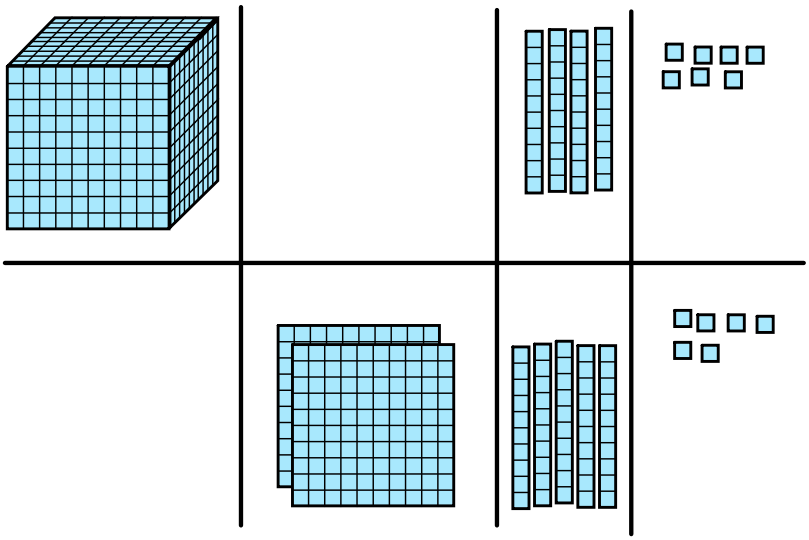
Example: Add 343_{five} and 2121_{five}.



Example: All numbers are base 5.

Standard:	Left to Right:	Lattice:
343 + 2121	343 + 2121	3 4 3 + 2 1 2 1
2103 + 2244		2 1 0 3 + 2 2 4 4

Example: (The Standard Algorithm) 1047 - 256.



Standard Algorithm:

$$\begin{array}{r} 1\ 0\ 4\ 7 \\ -\ 2\ 5\ 6 \\ \hline \end{array}$$

Example: (Equal Additions Algorithm)

$$\begin{array}{r} 1047 \\ -\ 256 \\ \hline \end{array}$$

$$\begin{array}{r} 2359 \\ -\ 467 \\ \hline \end{array}$$

$$\begin{array}{r} 5238 \\ -\ 478 \\ \hline \end{array}$$

Why does this work?

Example: All numbers are base 5.

Standard:	Equal Additions:
1 1 3 2 - 4 3 4	1132 - 434
4 3 0 2 - 3 4 2 3	4302 -3423

Example: All numbers are base 5.

Standard:	Equal Additions:
1 0 1 2 - 1 3	1012 - 13
3 0 0 1 - 1 3 2 3	3001 -1323